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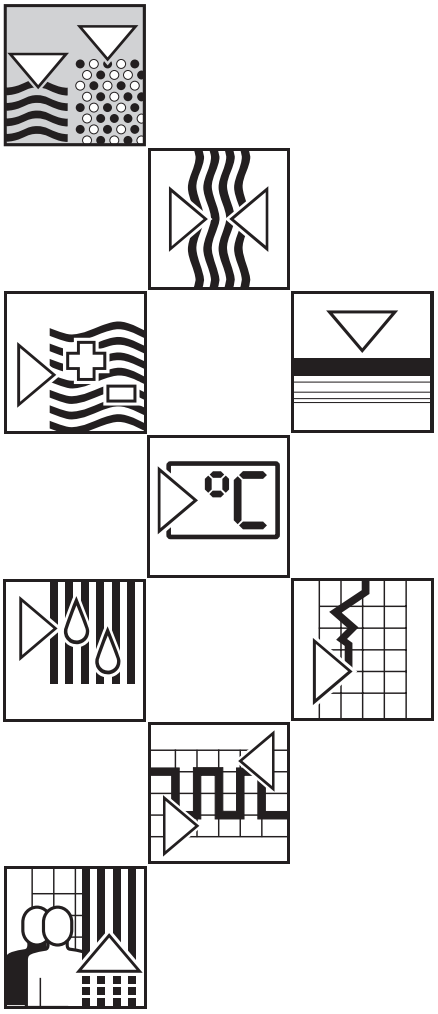
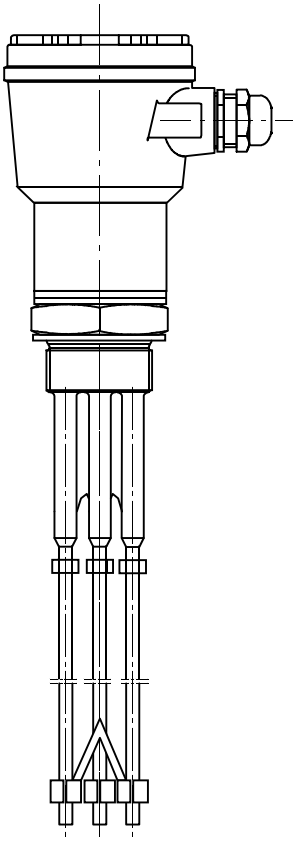
nivocompact
FTW 131
Level Limit Switch

Installation and Operating Manual





Endress+Hauser

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Contents

Applications

The Nivocompact FTW 131 is used for limit detection in tanks containing electrically conductive liquids.

Limits levels (minimum or maximum) can be determined by using one instrument with two probe rods.

Limit Detection

Two point detection (minimum and maximum) can be determined by using one instrument with 3 probe rods.

Two Point Detection

Pumps can be protected against dry running by installing a Nivocompact FTW 131 in the piping.

Pump Protection

Also for use in the food processing industry.

It is not recommended for applications with liquids containing oil or fat which can form an insulating film on the probe rods.

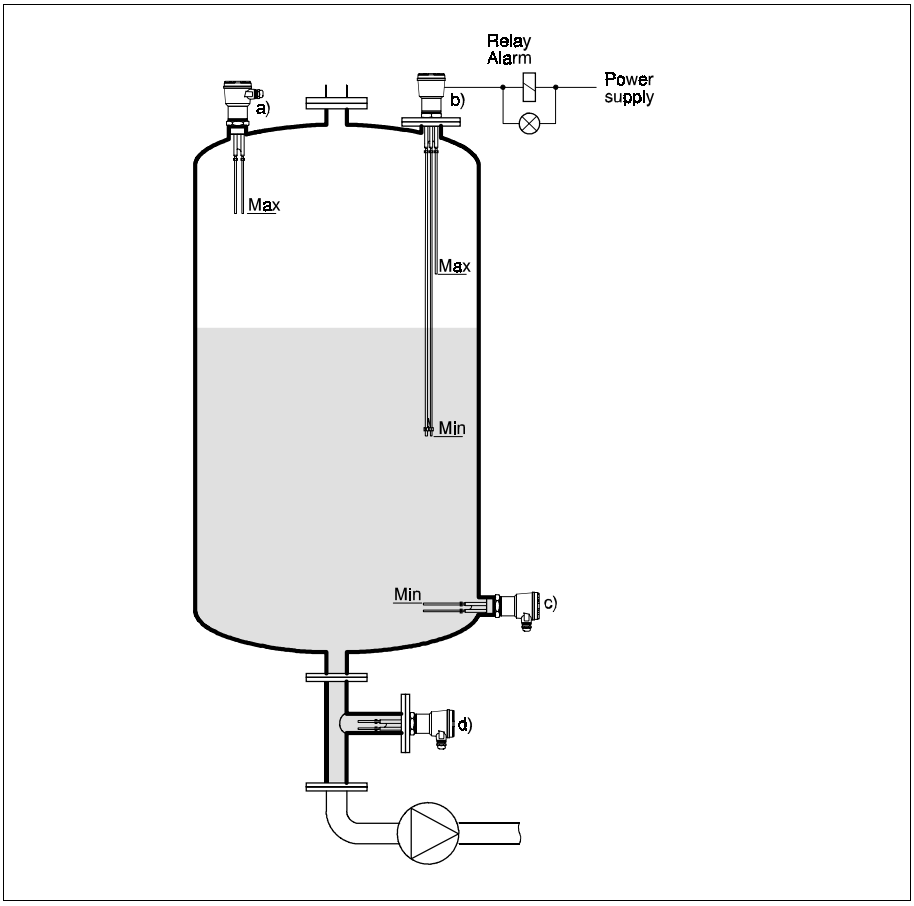


Fig. 1
a) Maximum limit detection
*b) Two point detection (maximum **and** minimum) with **one** Nivocompact*
c) Minimum limit detection
d) Pump protection

Application Examples

Water	Beer	Milk	Detergents
Syrups	Wine	Fruit juices	and similar
Vinegar	Liquors	Sugar solutions	liquids

Acids and alkalis with chemical properties which do not attack polypropylene or steel 1.4301, 1.4401 and 1.4571.

Technical Data

Operating Data

- Operating temperature in the tank: –20 °C…+100 °C
- Operating pressure in the tank: up to 6 bar
- Resistance to lateral load: max. 3 Nm per probe rod
- Ambient temperature for the housing: –20 °C…+60 °C
- Storage temperature: –40 °C…+85 °C

Probe

- Construction of process connection: thread G $1^1/_2$ A acc. to DIN ISO 228/I
- Process connection material: glass-fibre reinforced polypropylene
- Insulation in tank: glass-fibre reinforced polypropylene
- Probe rod material: stainless steel 1.4571 (SS 316 Ti)
- Probe connection material: stainless steel 1.4301 (SS 304)
- Locking nuts material: stainless steel 1.4401 (SS 316)

Housing Versions

- Aluminium housing, IP 55
- Aluminium housing, IP 66
- Aluminium housing with synthetic coating, IP 66
- Synthetic housing in PBTP, IP 66
  (Protection IP… acc. to DIN 40050)

Cable Gland

- Housing IP 55: standard PG in nickel-plated brass with NBR gasket for cable diameter 7...10 mm.
- Housing IP 66: water-tight PG in polyamide with Neoprene-CR gasket for cable diameter 5...12 mm.

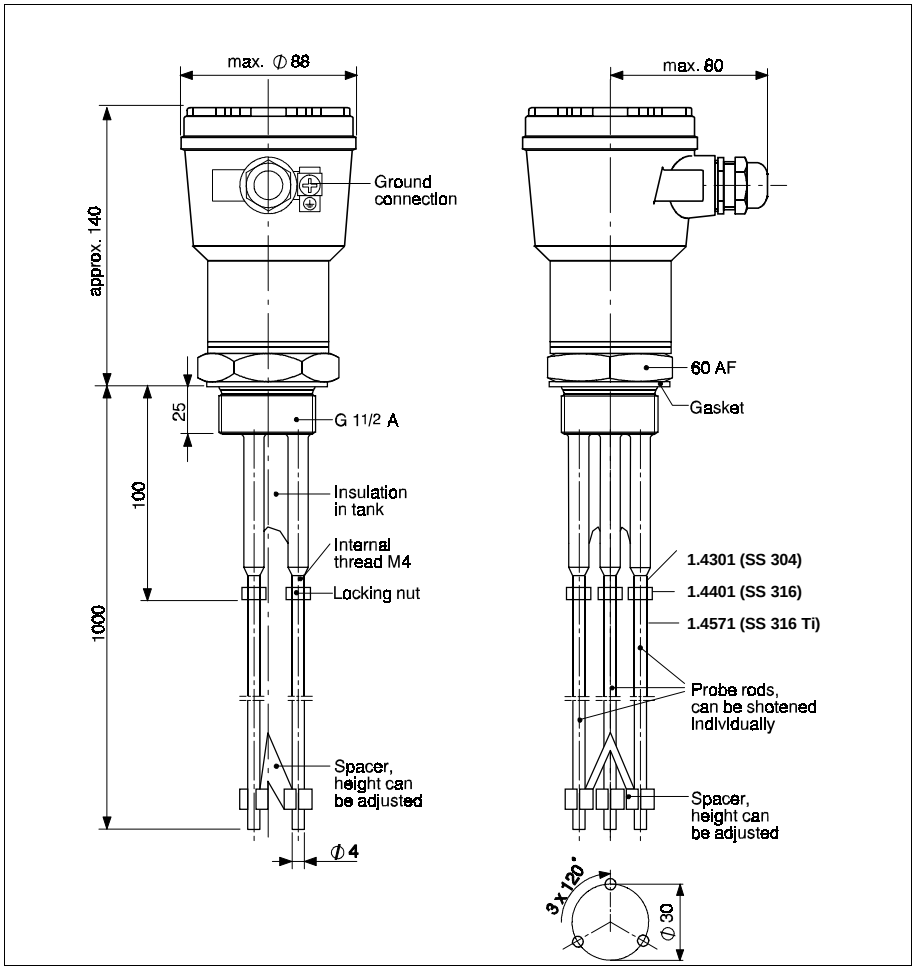


Fig. 2
Dimensions of the Nivocompact FTW 131.

Electronic Inserts

- Terminal connections: for max. 2.5 mm^2
- Adjustable resistance: approx. 300 Ω…50 kΩ, with 2 adjusters, infinitely adjustable
- Measuring frequency: approx. 5 kHz
- Probe voltage U_{pp}: max. 7 V (square wave signal)
- Probe circuit: electrically isolated from the power supply
- Switching delay: approx. 0.5 s
- Minimum/maximum fail-safe switching: selectable with rotary switch
- Switching indication: red LED

Electronic Insert EW 20 for AC (Two-Wire Connection)

- Power supply U~: 21 V...250 V, 50/60 Hz
- Connected loads, short-term (max. 40 ms): max. 1.5 A; max. 375 VA at 250 V; max. 36 VA at 24 V
- Maximum voltage drop: 11 V
- Connected loads, continuous: max. 350 mA, max. 87 VA at 250 V, max. 8.4 VA at 24 V
- Minimum load current at 250 V: 10 mA (2.5 VA)
- Minimum load current at 24 V: 20 mA (0.5 VA)
- No-load current (rms): 5 mA

Electronic Inserts EW 22, EW 23 for DC (Three-Wire Connection)

- Power supply U=: 10 V…55 V
- Superimposed AC voltage U_{pp}: max. 5 V
- Current consumption: max. 15 mA
- Load connection: Open Collector: PNP (EW 22) or NPN (EW 23)
- Switching voltage: max. 55 V
- Connected load, short-term (max. 1 s): max. 1 A
- Connected load, continuous: max. 350 mA
- Residual current with transistor blocked: < 100 µA
- Protected against reverse polarity

Electronic Insert EW 24 for DC and AC (Relay Output)

- Power supply U=: 20 V…200 V
  or
  Power supply U~: 21 V…250 V, 50/60 Hz
- Current consumption (rms): max. 5 mA
- Peak inrush current: max. 200 mA, max. 5 ms
- Pulse current: max. 50 mA, max. 5 ms
- Pulse frequency: approx. 1.5 s
- Output: potential-free change-over contact
- Contact load capacity:
  U~ max. 250 V, I~ max. 6 A,
  P~ max. 1500 VA ($\cos \varphi = 1$) or P~ max. 750 VA, ($\cos \varphi \geq 0.7$)
  U = max. 250 V, I = max. 6 A, P = max. 200 W
- Operating life: min. 10^5 switchings at max. contact load
- Additional switching delay: max. 1.5 s

EMC

- Electromagnetic compatibility according to EN 61326-1, Class B device

Type Key

See Page 11 for order specification and order code.

Subject to modification

Accessories

- Gasket for thread G $1^1/_2$ A:
  elastomer/fibre (asbestos-free) supplied
- Protective sun cover for aluminium housing
  Material: polyamide

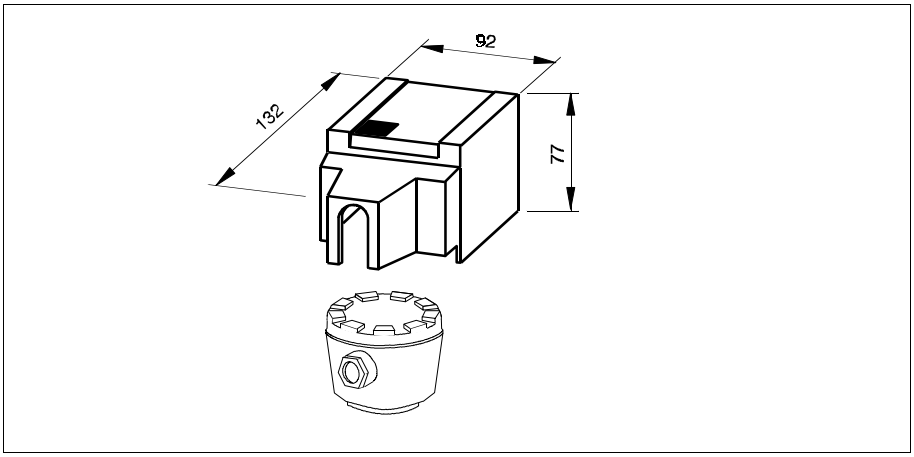


Fig. 3
Dimensions or protective sun cover (accessory).
This cover prevents condensation in the housing.

The Measuring System

The Nivocompact is an electronic switch.
The entire measuring system consists of:
- Nivocompact FTW 131
- power supply and
- connected control systems, signal transmitters (e.g. process control systems, PLC, relays, microcontactors, lamps, sirens etc.).

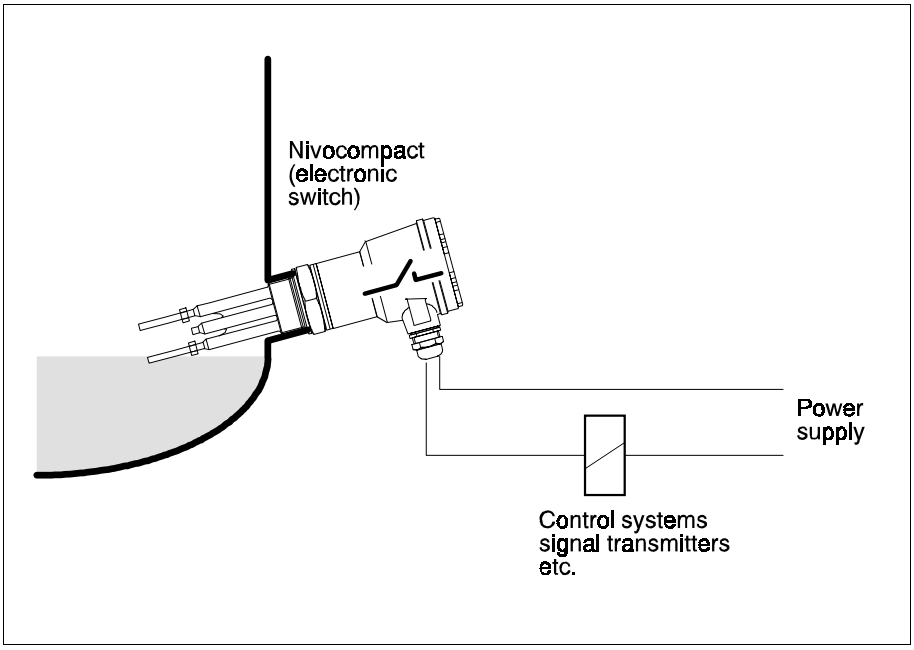


Fig. 4
The measuring system.

Function

A defined AC voltage exists between the probe rods in an empty tank.
As soon as the electrically conducting liquid creates a connection between the ground and maximum probe rods, the voltage is reduced and the Nivocompact switches.

With limit level detection, the Nivocompact switches back as soon as the liquid clears the maximum probe.
With two-point detection, the Nivocompact switches back only when the liquid clears the minimum probe.

Corrosion of the probe rods and the electrolytic destruction of the material is avoided in almost all applications by using AC.
The material used for the tank walls is not important as the system is designed as a closed potential-free circuit between the probe rods and the electronics.
There is absolutely no danger if the probes are touched while in operation.

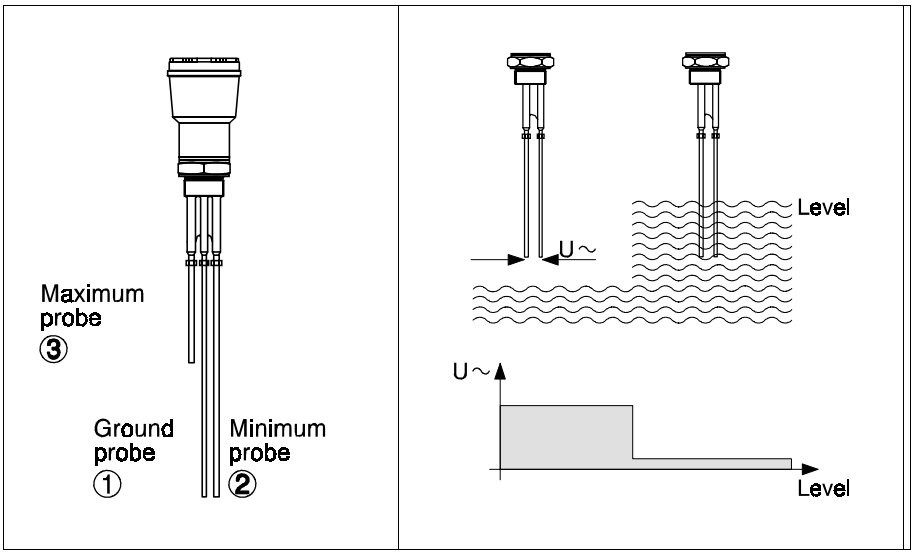


Fig. 5
Left: Functions of the three probe rods.

Right: Limit detection in operation.

Fail-Safe Mode

Due to the built-in feature for minimum/maximum fail-safe switching, the Nivocompact can be used in all applications requiring high operational safety:

Maximum fail-safe mode:
The circuit is blocked if the probe is covered or the power supply fails.

Minimum fail-safe mode:
The circuit is blocked if the probe is free or the power supply fails.

A red LED on the electronic insert indicates the switching status.
See also Fig. 22 in Section »Fail-Safe Switching«; Page 21.

Installation

Project Planning for Tanks

Tank Material

The Nivocompact FTW 131 can be installed in tanks made of electrically conductive or non-conductive materials.

Liquids Causing Build-up

Vertical mounting in the tank from above is recommended when used with liquids which tend to form a conductive deposit on the insulation.
Lateral mounting in a tank is possible only if the liquid leaves a film which is a poor conductor after clearing the insulation.

Mounting Point

The filling curtain must not touch the probe rods (error switching).
The probe rods should not touch metal walls or other electrically conductive installations (error switching).

Mounting from Above

For vertical mounting, the probe lengths should be positioned according to the limit level required.
The Nivocompact switches if the probe rods are submerged a few millimeters in the liquid.

Mounting from the Side

Probe rods of 20…30 mm (probe lengths 120…130 mm) are generally adequate for mounting from the side.
If the probe has to be mounted in a tank with liquid which causes build-up, then longer probe rods (100…200 mm) may be required. These provide a more favorable resistance ratio between covered and free probes having slightly conductive insulation.
If the probe is to be mounted from the side, then it should be pointed slightly downwards to enable the liquid to drip off more easily and reduce any conductive build-up on the insulation which may occur.

Installation Examples for Limit Detection

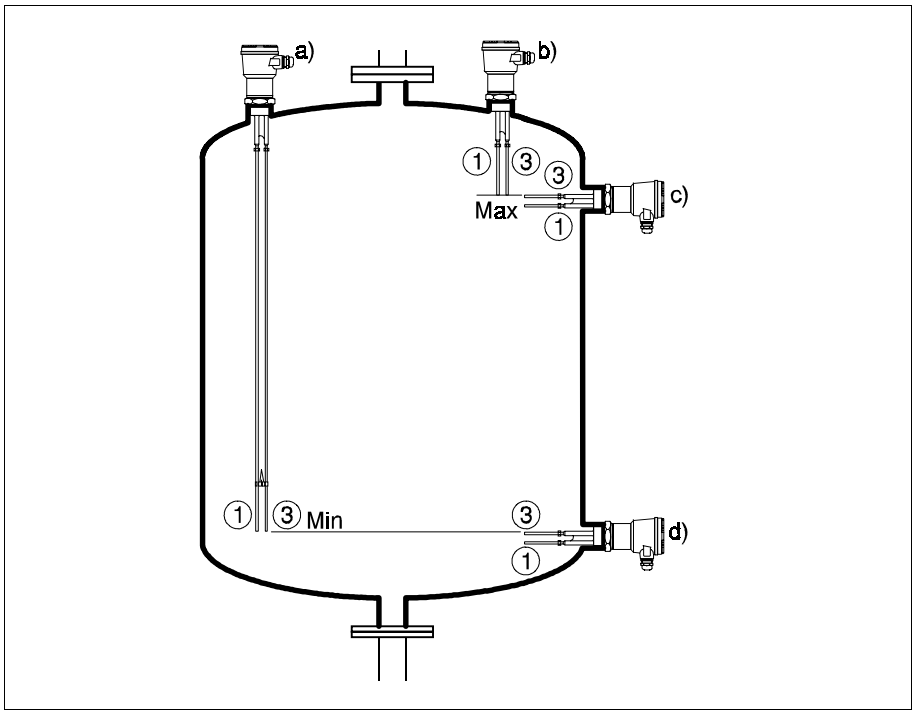


Fig. 6
Limit detection
Standard applications

Mounting in a tank made of plastic or metal.

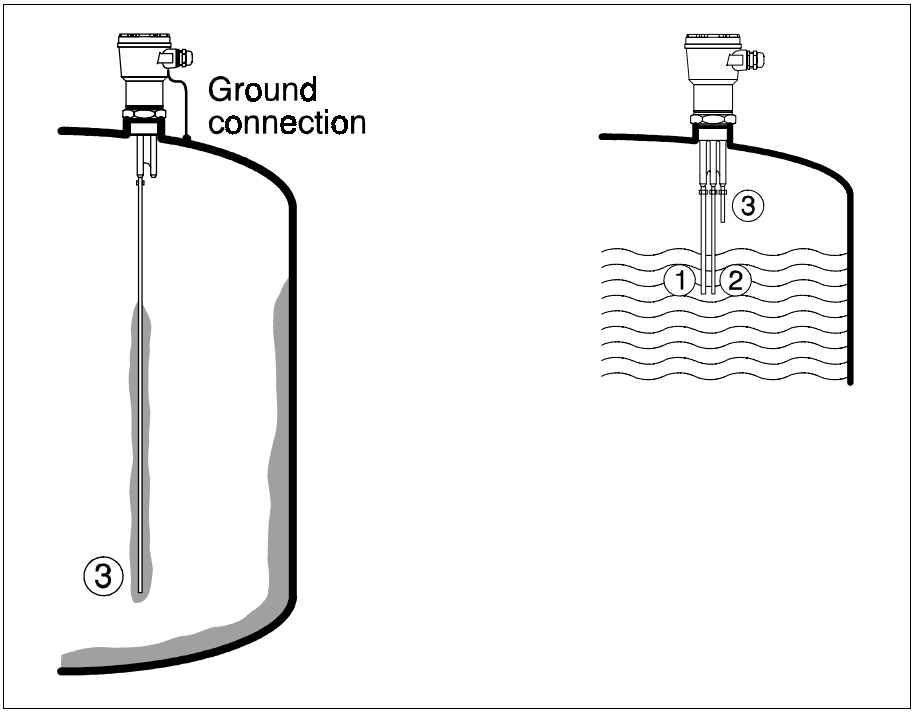
a) Vertical mounting, minimum detection, probe length set to the limit value required.

b) Vertical mounting, maximum detection, probe length set to the limit required.

c) Lateral mounting, maximum detection, short probe rods.

d) Lateral mounting, minimum detection, short probe rods.

① and ③ are the numbers assigned to the probe rods required.



Further Installation Examples for Limit Detection

Fig. 7
Left:
Limit detection in tanks made of metal with liquids which tend to cause conductive build-up or contain fibrous material.

E.g. minimum detection shown here.

The ground rod ① is replaced by the ground connection to the metallic tank wall.

Right:
Limit detection in a tank with a liquid having pronounced rippling or splashing, with mounting from above.

E.g. maximum detection shown here.

The difference in length between
The minimum probe ② and the maximum probe ③ must be greater than the maximum splashing height.

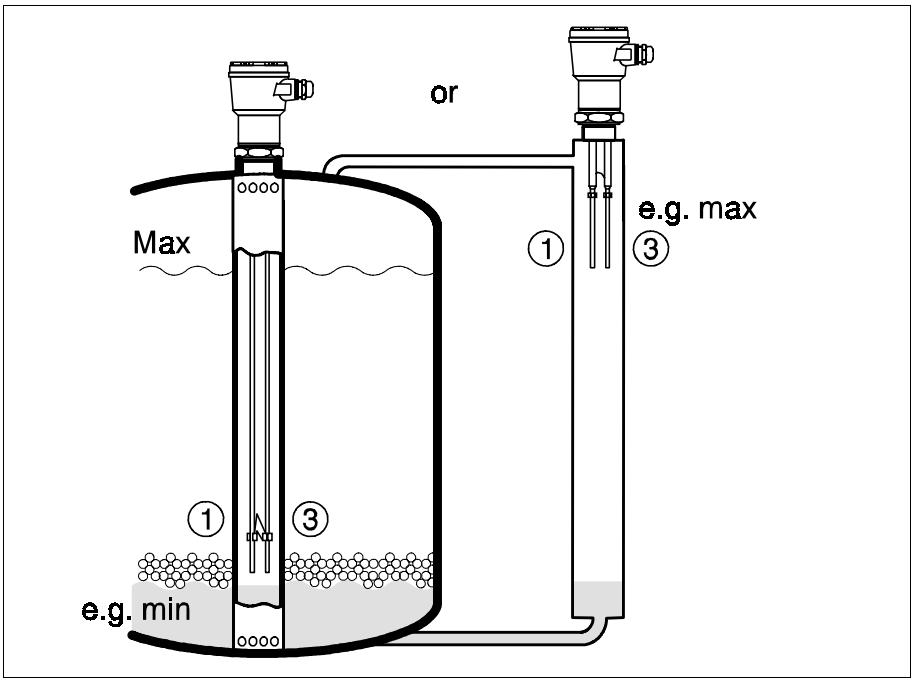


Fig. 8
Limit detection
with strong flows, high ripple or foam build-up.
A bypass made of metal or plastic inside or outside the tank.
Inlet below the minimum level, vent above the maximum level.

Installation Examples for Two Point Detection

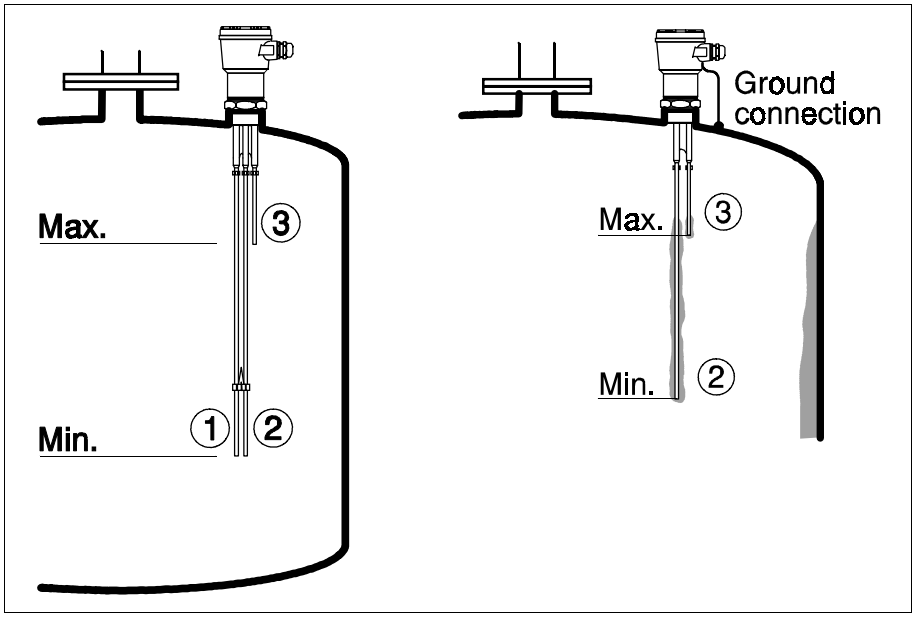


Fig. 9
Left
Two point detection, standard applications

Mounting in a tank made of plastic or metal.

Note the numbers assigned to the probes.

Right
Two point detection in tanks made of metal with liquids which tend to form a conductive build-up or contain fibrous material.
The ground rod ① is replaced by the ground connection to the metal tank wall.

Mounting in Pipes

Pipe Material

The Nivocompact FTW 131 can be installed in pipes made of either electrically conductive or non-conductive material.

Probe Lengths

The shortest possible probe length should be used (normally 20…30 mm is adequate), in order not to hinder the flow and to simplify mounting.

Installation Point

Take into account the maximum lateral load of the probe when determining the measuring point.
Note the flow velocity, viscosity and pipe diameter, and mount the probe, where possible, away from the flow.

Liquids Containing Solid Particles

Hard solid particles in the liquid can lead to the insulation wearing away. Long, fibrous materials can settle on the rod probes and so produce error switching in an empty pipe.

Installation Example

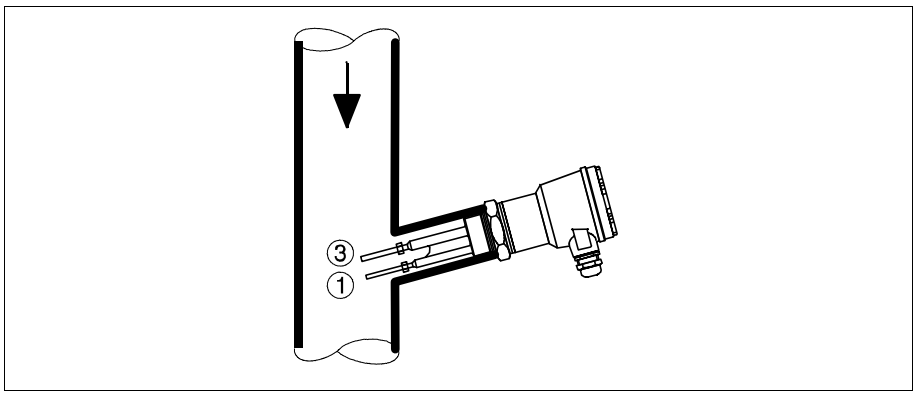


Fig. 10
Pump protection
Ideal mounting in a vertical pipe: the threaded socket is welded pointing downwards so that liquid can run off easily. The insulating unit is kept some distance from the liquid flow by the long threaded socket so that there is no pressure loss, no wear and no lateral forces acting on the probe.

Mounting in the Open

A protective sun cover available as an accessory protects the Nivocompact with the aluminium housing from excessive temperatures and from condensation which may form in the housing due to large temperature variations.

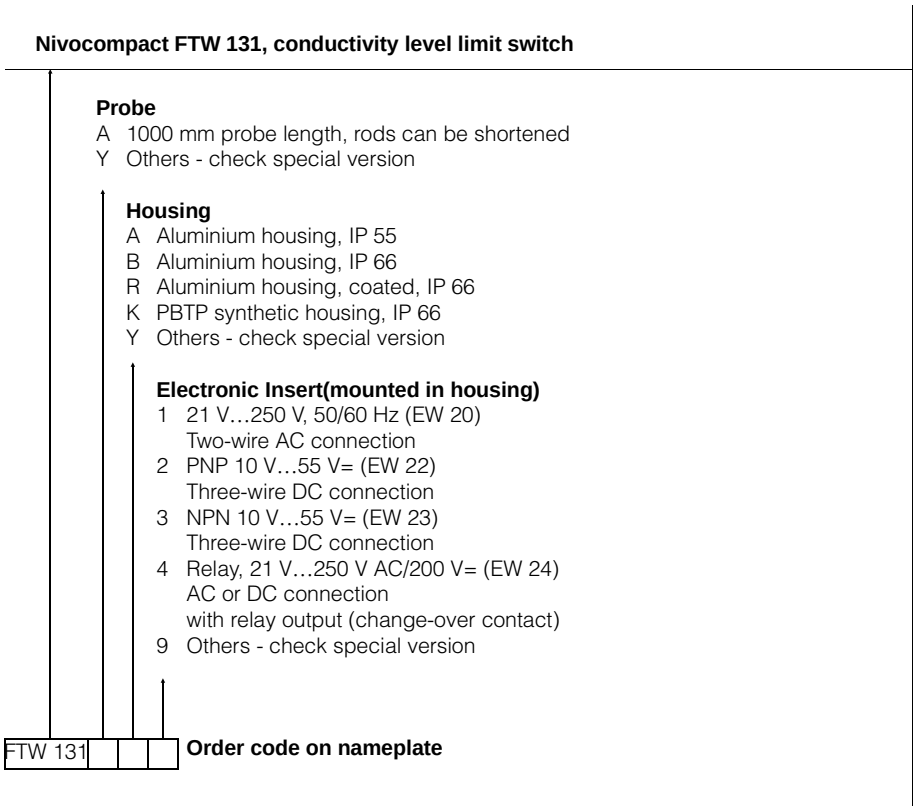
Installation

Tools Required for Installation

- Open-end spanner 60 AF
- Open-end spanner 7 AF
- Metal cutting saw
- Screwdriver, blade width 5… 6 mm or Phillips screwdriver PZD 2

Comparing the Order Code

Compare the order code on the nameplate of your instrument with the order specification key to ensure that the correct instrument is being installed.



Shortening the Probe Rods

Shorten the probe rods to the lengths required.
When doing this, take into account the length of the threaded boss, the insulation of the Nivocompact FTW 131 and the length of the threaded boss of the probe rods.
When sawing a rod, make sure that its thread is not damaged.

① Ground Probe
The long probe for two point detection and for single point detection, if the Nivocompact is mounted from above.

② Minimum Probe
It is the same length as ① for two point detection.
It is not present for single point level detection.

③ Maximum Probe
The short probe for two point detection.
It is the same length as ① for single point limit detection.

Screwing in the Probe Rods

- Screw the locking nuts onto the probe rods
- Screw the rod probes into the correct threaded insert:
  The numbers are found on the surface underneath the thread.
- Tighten the locking nuts so that the probe rods cannot work loose from vibration or movement of the liquid.

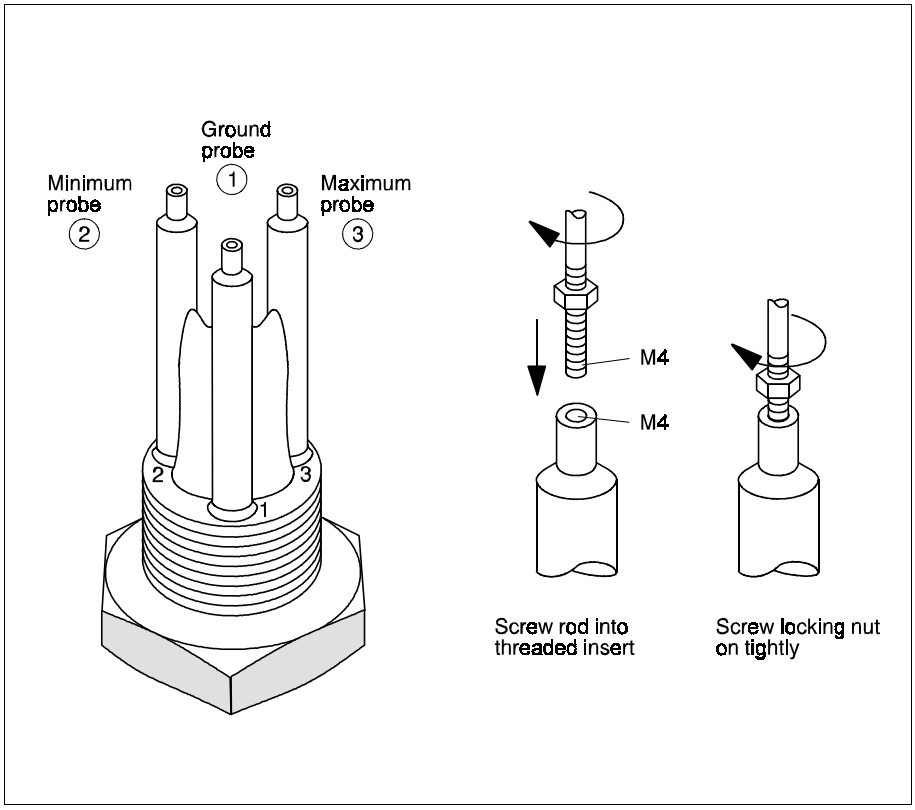


Fig. 11
Left
Arrangement of the probe rods on the insulating unit of the Nivocompact FTW 131 in a tank.

Centre
Screw the rod into the threaded insert

Right
Tighten the lock nut

With long rods: attach the spacer in the lower third of the rod length; the point of the spacer should be oriented upwards (towards the threaded boss). This allows it to dry quicker.

Attaching the Spacer

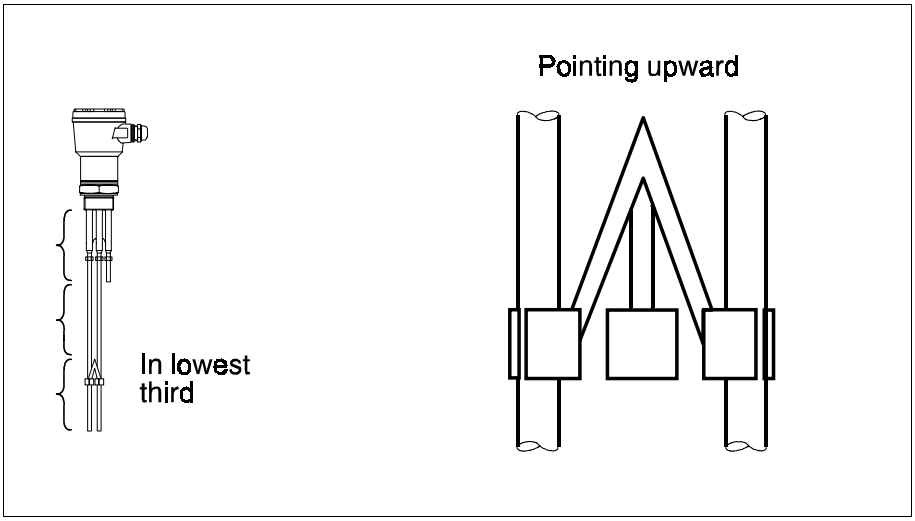


Fig. 12
Securing the spacer.

- Place the elastomer/fibre gasket supplied against the sealing surface of the Nivocompact. (Do not apply sealing material around the thread!)
- When screwing in, turn the instrument by the 60 AF hex nut only!
- If the instrument does not turn easily, then carefully cut into the thread of the threaded sleeve.
- A torque of 80 Nm… 100 Nm is normally sufficient to produce a reliable seal to withstand pressures up to 6 bar. See Fig. 13.
  A torque of more than 120 Nm will destroy the plastic thread.

Screwing in the Nivocompact FTW 131

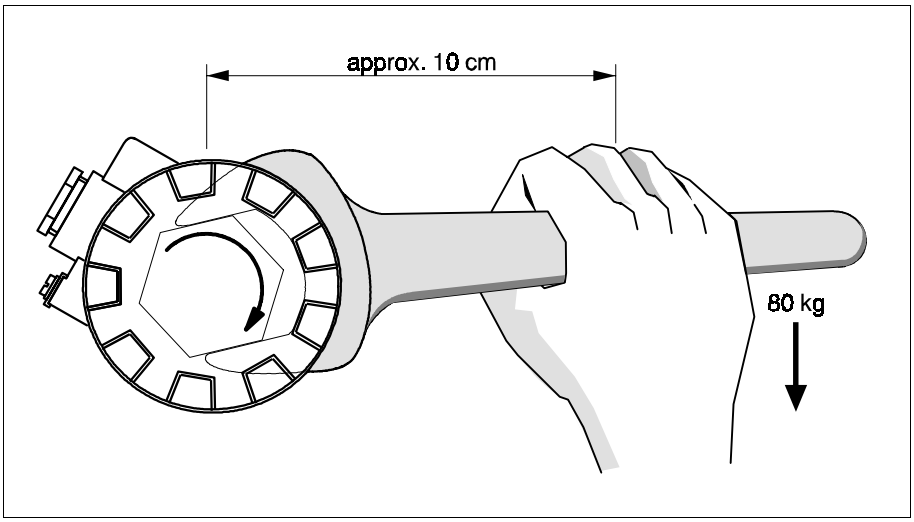


Fig. 13
Turn with a torque of approx. 80 Nm…100 Nm!

For lateral mounting of the Nivocompact this means:
If you weight approx. 80 kg. you can support your total body weight if you hold the spanner (60 AF) approx. 10 cm from the centre of rotation.

Rotating the Housing

The housing can be rotated if the cable gland is facing in the wrong direction after the Nivocompact has been securely screwed in:

Loosening
- Unscrew and remove the housing cover
- Loosen the central screw in the electronic insert
- Remove the plug-in electronic insert from the housing using the handle
- Slightly loosen the 3 screws in the housing, see Fig. 14.

Rotating
- The housing can now be rotated through 360°.
  When mounting the FTW 131 from the side, the cable gland should point downwards so that no moisture can enter

Tightening
- Tighten up the 3 screws in the housing so that the housing is well sealed at the hex nut
- Insert the electronic insert in the plug
- Securely tighten the central mounting screw while making sure that the cable gland remains free

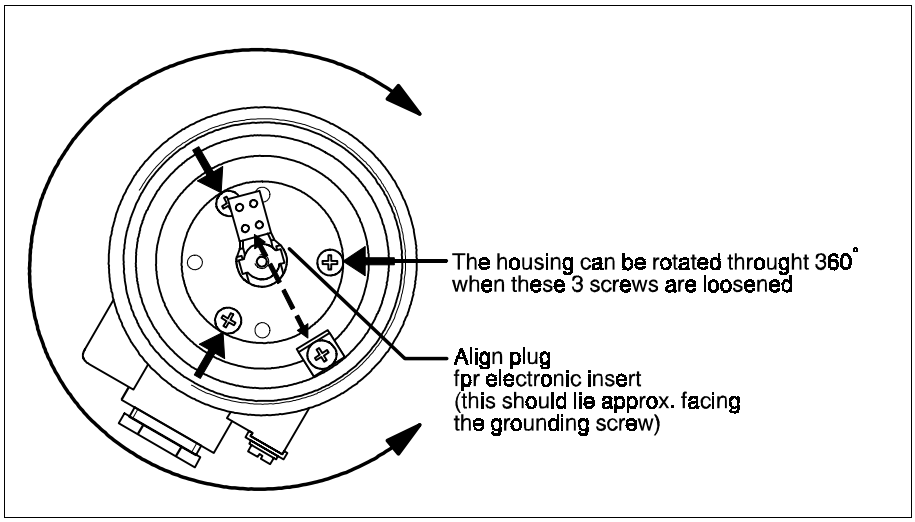


Fig. 15
Loosening and rotating the housing.

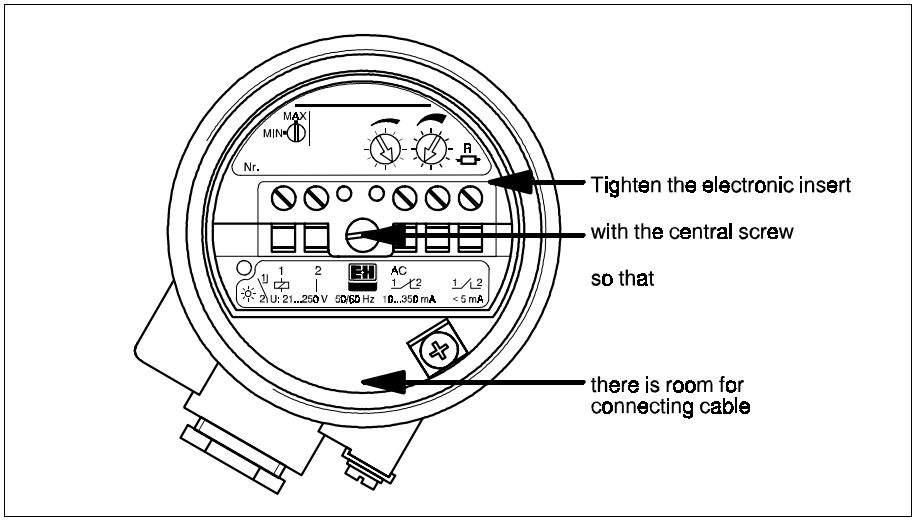


Fig. 14
Securing the electronic insert.

Connection

Wiring Connections

Main Features of the Different Electronic Inserts

The last number of the order code on the nameplate identifies which type of electronic insert is mounted in the Nivocompact FTW 131:

1=Electronic insert EW 20
Two-wire AC, voltage: 21 V…250 V
Electronic switch, max. 350 mA

2=Electronic insert EW 22
Three-wire DC, voltage: 10 V…55 V
Transistor circuit, load connection PNP, max. 350 mA

3=Electronic insert EW 23
Three-wire DC, voltage: 10 V…55 V
Transistor circuit, load connection NPN, max. 350 mA

4=Electronic insert EW 24
with potential-free relay output
AC power supply 21 V…250 V or
DC power supply 20 V…200 V

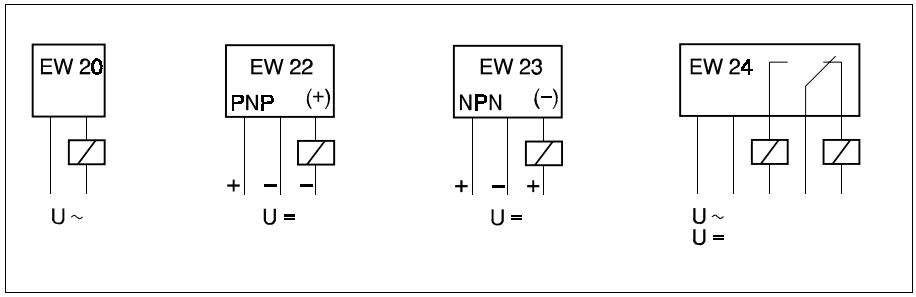


Fig. 16
Main Features of the Different Electronic Inserts.

Load Limit Values

Note the limit values of the loads to which you want to connect the Nivocompact. Exceeding the load can destroy the electronic insert (or the relay contact in the EW 24).

Fuse

Ensure that the rating of the fine-wire fuse corresponds to the maximum load to be connected.
The fine-wire fuse does not protect the electronic insert of the Nivocompact FTW.

Diameter of Wiring

Because of the small current used, only small diameter cabling is required. Low-cost cabling with diameters of 0.5 mm^2 to max. 1.5 mm^2 is recommended.

Grounding

Every Nivocompact with a metal housing must be connected to the protective ground cable PE except when operating with a protected extra-low voltage.

Grounding to the Tank

The power supply and the measuring current circuit are electrically isolated. Only the ground cable PE and the ground probe (No. 1) are connected together. A ground connection to the tank is therefore only required in special circumstances (see Project Planning Fig. 7 left and Fig. 9 right).

Connecting the Nivocompact FTW 131 with Electronic Insert EW 20 for AC (Two-Wire Connection)

Connecting in Series to a Load

The level limit switch Nivocompact with the above electronic insert must - like all switches - be connected in series via a load (e.g. relays, microcontactors, lamps) to the power supply.

Direct connection to the power supply without any intermediate load connected (short-circuit!) will result in immediate and permanent damage to the electronic insert.

The load can be connected to Terminal 1 or 2 of the electronic insert.
It is unimportant whether L 1 is connected to Terminal 1 or 2.

Power Voltage

The voltage across Terminal 1 and 2 of the electronic insert must be at least 21 V.
The power voltage must be correspondingly higher to compensate for the voltage drop across the connected load.

Load Cutoff

Note that loads connected in series are not completely disconnected from the power supply if the electronic switch in the electronic insert of the Nivocompact »disconnects« (blocks) with level alarm.
Because of the current requirements of the electronics, a small »no-load current« still flows through the connected load.
When the load is a relay with a very small retaining current, then it is possible that the relay does not de-energise. In this case connect an additional load in parallel to the relay e.g. a resistor or signal lamp.

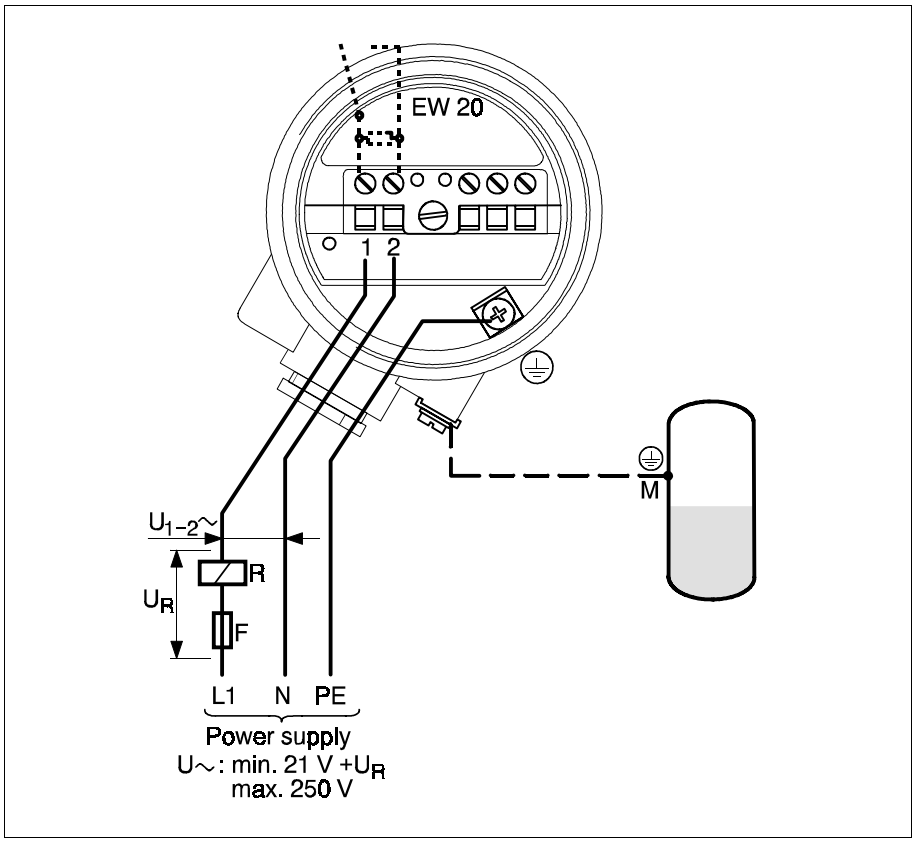


Fig. 17
Connecting the Nivocompact FTW 131 with electronic insert EW 20

U_{1-2}~: 21 V...250 V across Terminals 1 and 2 of the EW 20
R: Connected (external) load, e.g. relay
F: Fine-wire fuse, load-dependent
M: Ground connection to tank, if required
U_R: Voltage drop across the load R and the fine-wire fuse F

Connecting the Nivocompact FTW 131 with Electronic Insert EW 22 for Three-Wire DC Connection PNP

Transistor Circuit for Load

The load connected to Terminal 3 is switched by a transistor, contactless and therefore without bounce.

Terminal 3 has a **positive** signal in normal switching mode.

The transistor is blocked on level alarm or with a power failure.

Protection Against Voltage Peaks

Connecting to an instrument with a high inductance:
a voltage limiter should be connected.

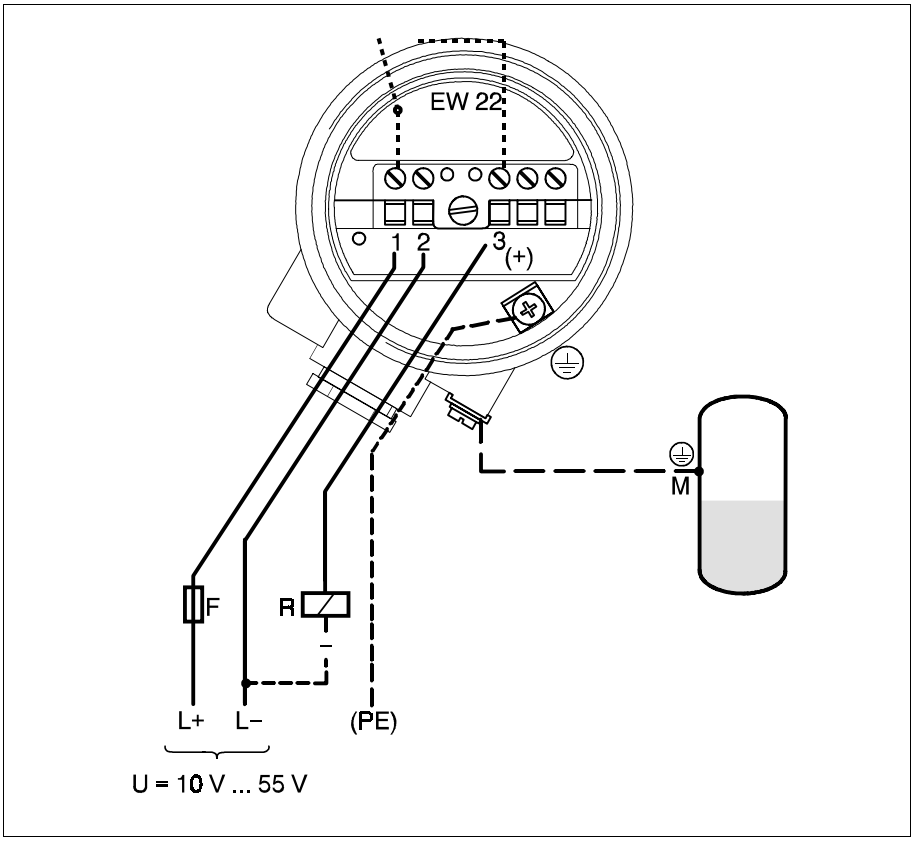


Fig. 18
Connecting the Nivocompact FTW 131 with electronic insert EW 22 (PNP connection)

R: Connected load e.g. PLC, PCS, relay.
F: Fine-wire fuse, load-dependent
M: Ground connection from tank, if required

Connecting the Nivocompact FTW 131 with Electronic Insert EW 23 for Three-Wire DC Connection NPN

Transistor Circuit for Load

The load connected to Terminal 3 is switched by a transistor, contactless and therefore without bounce.

Terminal 3 has a **negative** signal in normal switching mode.

The transistor is blocked on level alarm or with a power failure.

Protection Against Voltage Peaks

Connecting to an instrument with a high inductance:
a voltage limiter should be connected.

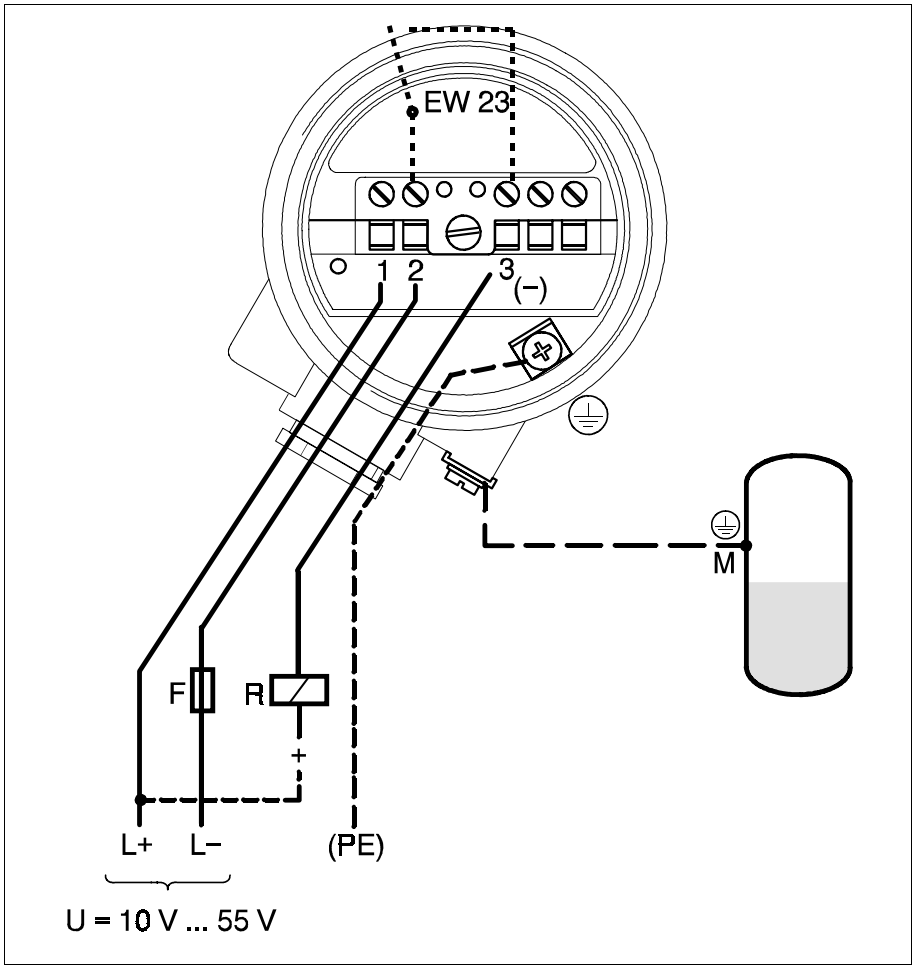


Fig. 19
Connecting the Nivocompact FTW 131 with electronic insert EW 23 (NPN connection)

R: Connected load, e.g. PLC, PCS, relay
F: Fine-wire fuse, load-dependent
M: Ground connection from tank, if required

Connecting the Nivocompact FTW 131 with Electronic EW 24 for DC and AC (Relay Output)

Power Supply

With AC, it is unimportant whether L1 or N is connected to Terminal 1.
With DC, it is unimportant whether L+ or L– is connected to Terminal 1.

Relay Contact for Load

The load is connected over a potential-free relay contact (change-over contact).
The relay contact breaks the connection between Terminal 3 and Terminal 4 on level alarm or on a power failure.

Protection Against Voltage Peaks and Short-Circuiting

Protect the relay contact by connecting a spark barrier to instruments with high inductance.
A fine-wire fuse (load-dependent) can protect the relay contact if a short-circuit occurs.

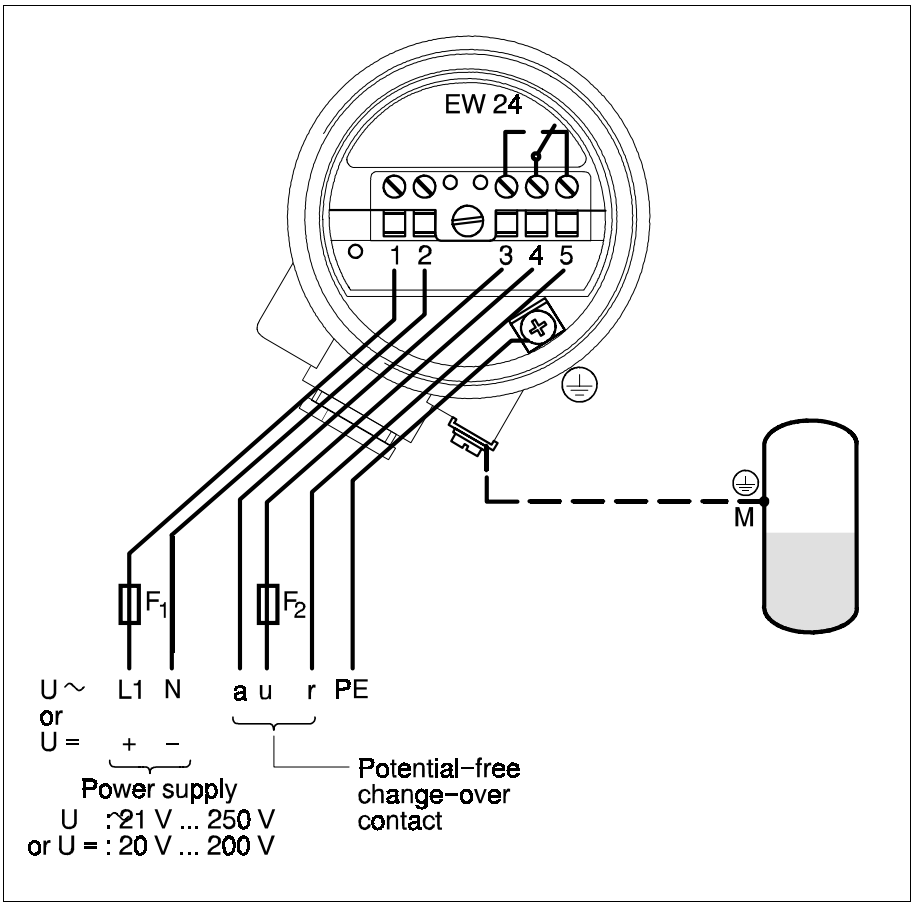


Fig. 20
Connecting the Nivocompact FTW 131 with electronic insert EW 24 (relay output)

F_1: Fine-wire fuse 200 mA, semi-time lag, recommended
F_2: Fine-wire fuse to protect the relay contact, load-dependent
M: Ground connection to tank, if required

Wiring On-Site

Tools Required for Connection

- Open-end spanner 22 AF
- Screwdrivers, blade width 3.5 mm and 10 mm or Phillips screwdrivers PZD 1 and PZD 2
- Usual electrical tools

Before connecting, make sure that the power supply used is the same as that stated on the nameplate of the electronic insert.

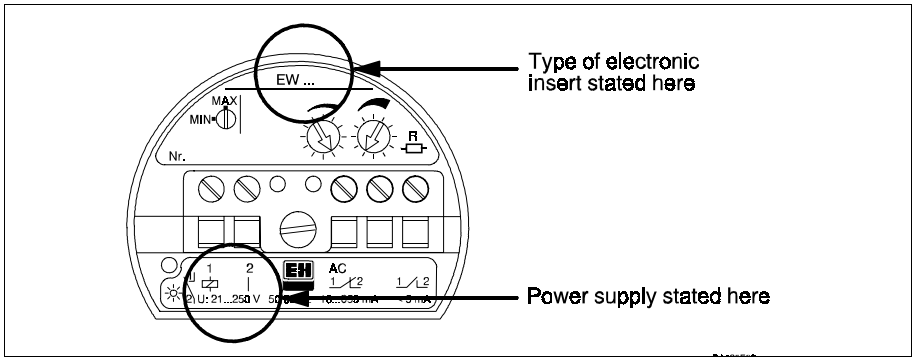


Fig. 21
Note the power voltage stated on the nameplate!

Electrical Connections

Connect the Nivocompact according to the appropriate diagram Fig. 17 to Fig. 20.

Ensure that no water gets into the housing while connecting up.

The gasket in the standard cable gland is designed for cable diameters from 7 mm to 10 mm.
A suitable gasket must also be used for other cable diameters.

You can seal with the »water-tight« cable gland with cables having diameters from 5 mm to 12 mm.

With installations shown in Fig. 7 left or Fig. 9 right:
Connect the ground cable on the outside of the housing of the Nivocompact to the metal tank.

After Connecting

Tighten cable gland to comply with the standard of Protection IP 55 or IP 66.

For applications in the open or in moist surroundings, sealing the standard cable gland with sealing compound is also recommended.
(This is not required with the »water-tight« cable gland).

Calibration

Tools Required for Calibration

- Screwdriver with blade width approx. 3 mm
- Screwdriver with blade width approx. 4 mm

The rotary switches and adjusting elements for calibration are on the electronic insert in the housing.
The power connections with voltages up to 250 V are directly beside these calibration elements.
Only use a screwdriver which has insulation as far as the blade or else tape over the terminals with insulating tape before calibration.

Turn on the power supply.

Safety Switching

By using the rotary switch, select the fail-safe mode for your particular application:

- Maximum fail-safe: The load circuit is blocked if the probe is covered or the power supply fails.
- Minimum fail-safe: The load circuit is blocked if the probe is uncovered or the power supply fails.

Changing the fail-safe mode also changes the LED status indication.

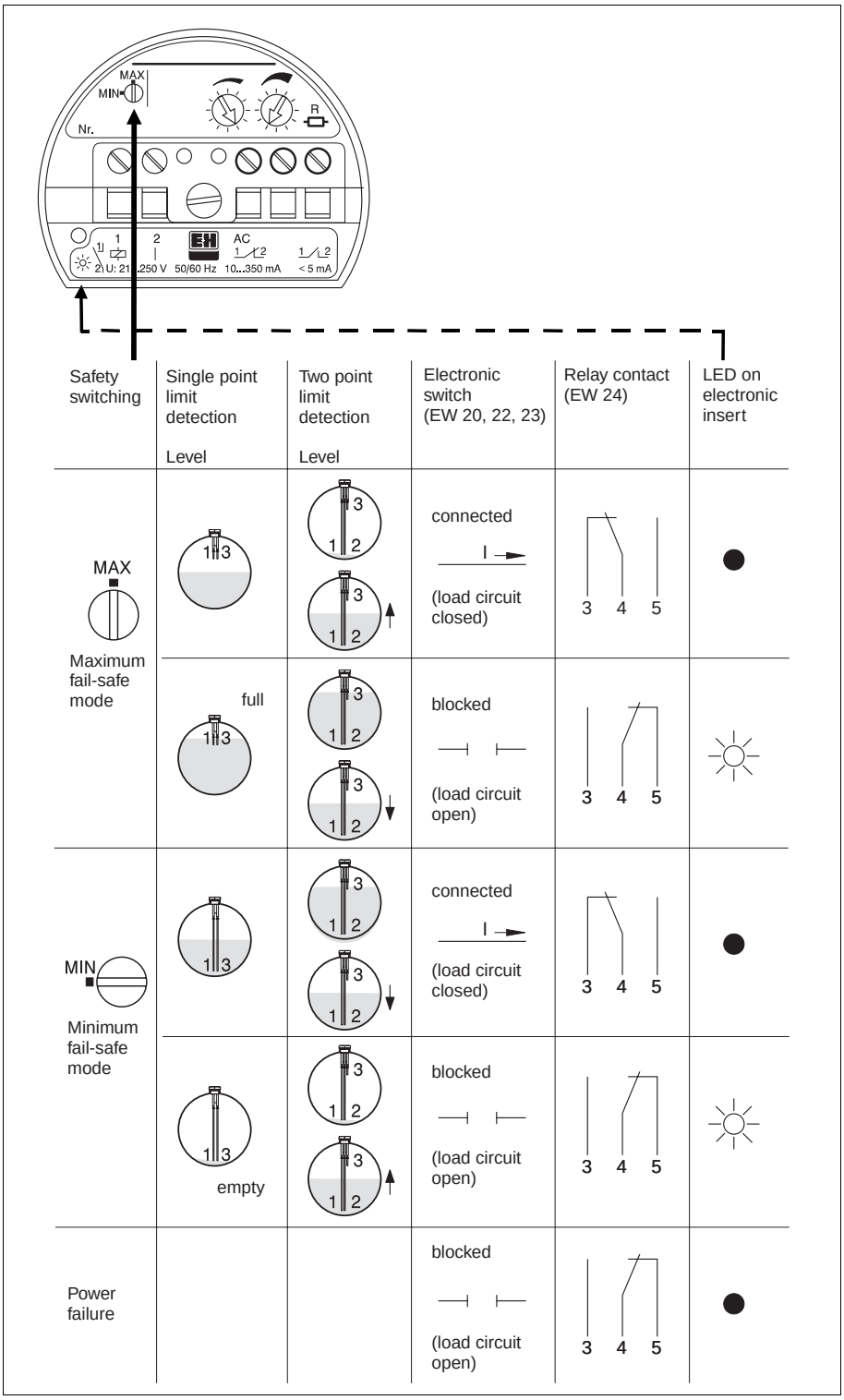


Fig. 22
Selecting the fail-safe mode and function.

Resistance
Standard Calibration

See Fig. 23 for the standard calibration of the contact resistance.
The Nivocompact FTW 131 is then so calibrated that when the probe is covered, all contact resistances up to approx. 3 kΩ will cause switching.

Contact resistances of conductive liquids are generally much lower, and especially with moist conditions and light contamination, the resistances on the probe insulation are significantly higher which ensures accurate detection.

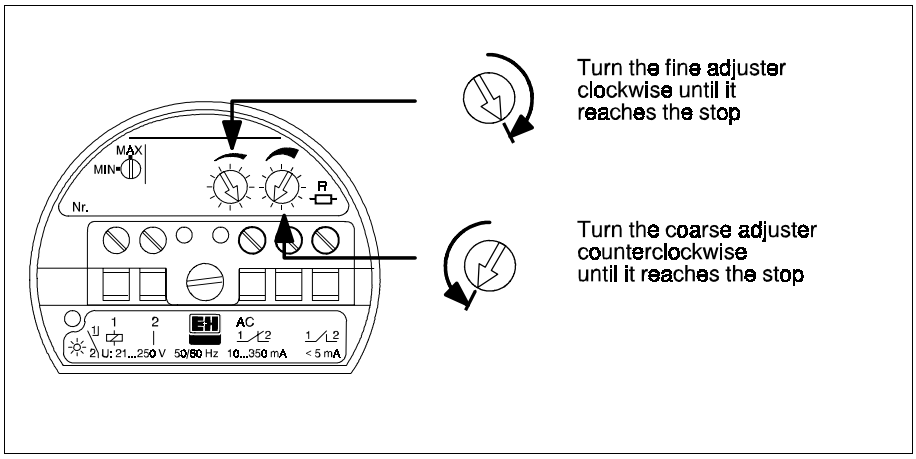


Fig. 23
Standard calibration for contact resistance.

Special Applications: Resistance Calibration

This calibration is only required if
- the conductivity of the liquid in the tank is very low, i.e. the resistance is greater than 3 kΩ once the probe has been covered

or
- a conductive build-up forms on the probe insulation, the resistance of which is lower than 3 kΩ once the probe has been cleared.

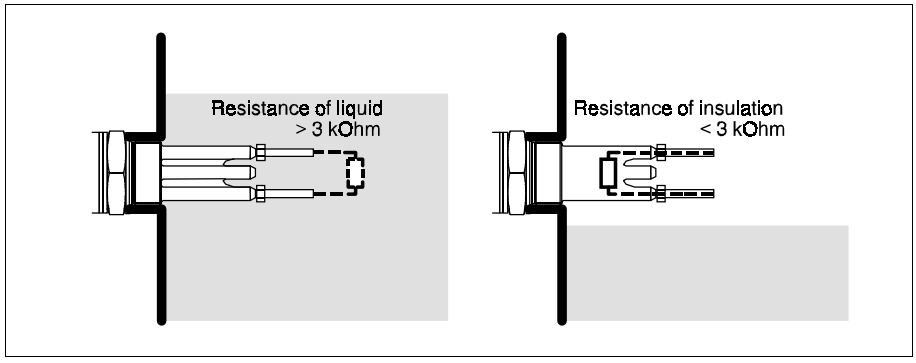
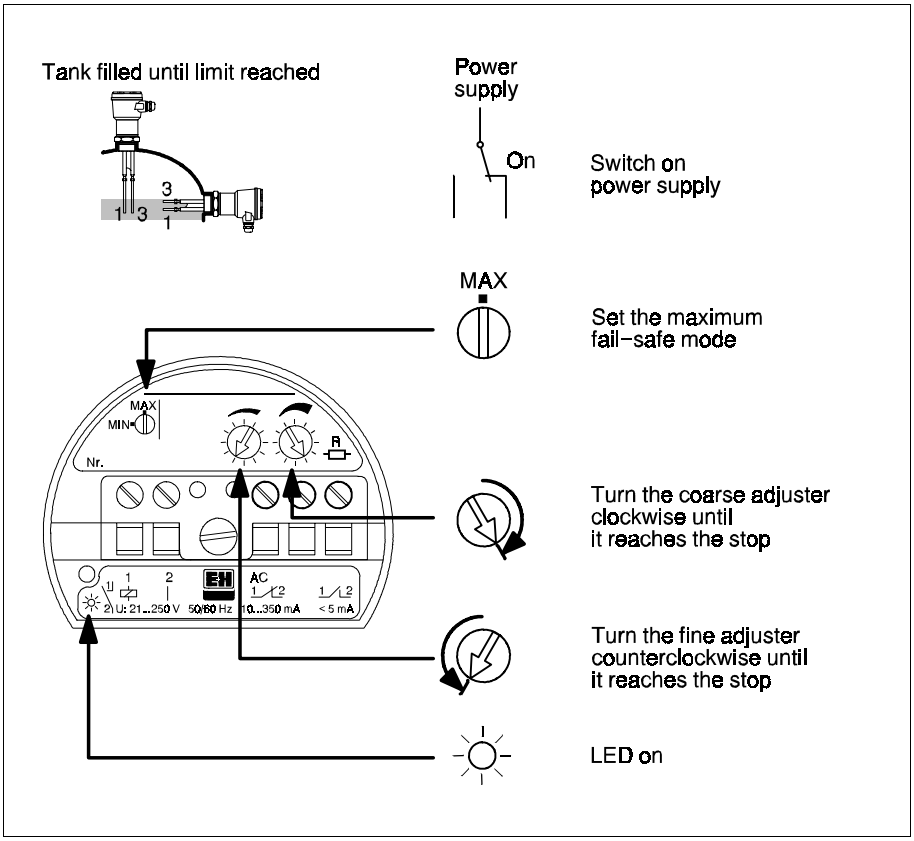


Fig. 24
A resistance calibration is only required in these cases.

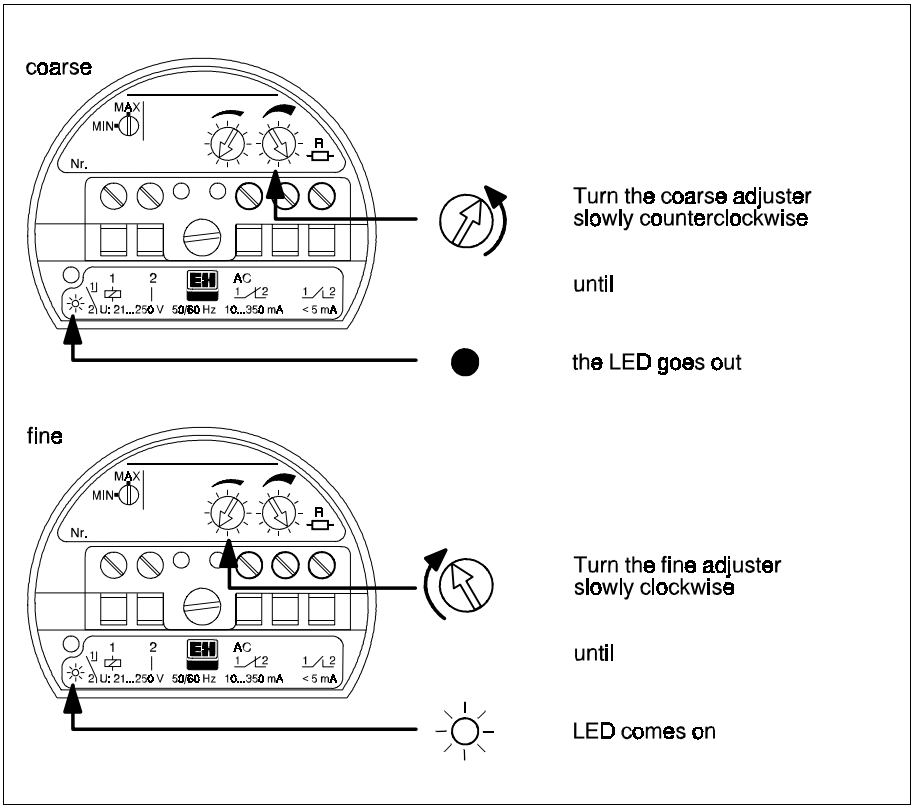
To carry out this calibration, the tank must be filled to the required limit point.

Carry out the calibration according to the sequence of diagrams Fig. 25 to Fig. 26.



Resistance Calibration, Initial Settings

Fig. 25
This initial setting must be done before the resistance calibration.



Determining the Switching Point

Fig. 26
Accurate adjustment ensures high switching reliability during operation.

- Select the safety switching required (see Page 21).
- Check the operation by filling and emptying the tank.

Do Not Forget!

Function Control

Check for correct operation for limit detection by filling and emptying the tank so that the material moves over the installation point of the probe or through the required limit point!

Final Points

Screw the housing cover securely down after connection and calibration so that the standards comply with Protection IP 55 or IP 66.

For applications in the open, a protective sun cover (accessory) should be used to cover the aluminium housing of the Nivocompact.

Maintenance

The conductive level limit switch Nivocompact FTW 131 requires no maintenance when correctly installed and used properly under the normal conditions specified by the system.

When cleaning and checking the tank:
- Clean the insulation, the spacer and the probe rods
- Check to make sure that the insulation is not damaged
- Check to make sure that the probe rods are still securely screwed in
- Ensure that the cable gland and the housing cover are screwed down tightly so that no moisture can enter.

Troubleshooting

When an error is indicated, first check to make sure that
- The Nivocompact is properly connected
- There is a power supply to the terminals
- All instruments connected are operating correctly
- In the case of the electronic insert EW 20 the minimum required load of the connected instrument is at least present
- The correct fail-safe mode has been selected
- The probe rods are of the correct length and screwed into their correct positions
- The probe rods are securely screwed in
- The adjusters for resistance calibration are in the standard position

Carry out a function control and, if required, a special resistance calibration.

Refer to the Error Tables Fig. 27 and Fig. 28.

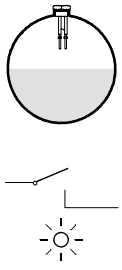
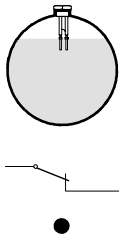
Error with maximum fail-safe mode		Possible causes
Probe free (level below maximum) but with electronic switch blocked LED on		- Insulation unit very dirty and conductive - Spacer very dirty and conductive - Probe rods bent, touching each other or the metal wall - Probe rods connected by build-up - Water in housing
Probe covered (level above maximum) but with electronic switch connected LED off		- Probe rods covered with insulating coating - Probe rod loose or fallen out - Liquid with very low conductivity

Fig. 27
Troubleshooting with maximum fail-safe mode.

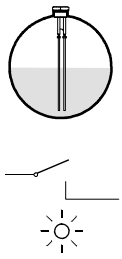
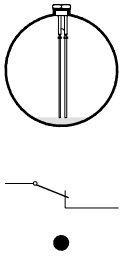
Error with minimum fail-safe mode		Possible causes
Probe covered (level above minimum) but with electronic switch blocked LED on		- Probe rods covered with insulating coating - Probe rod loose or fallen out - Liquid with very low conductivity
Probe free (level below minimum) but with electronic switch connected LED off		- Insulation unit very dirty and conductive - Spacer very dirty and conductive - Probe rods bent, touching each other or the metal wall - Probe rods connected by build-up - Water in housing

Fig. 28
Troubleshooting with minimum fail-safe mode.

Guarantee

Our guarantee terms are included with the documents accompanying delivery. Copies may also be obtained from the agent responsible.
Any modification carried out within the instrument during the guarantee period invalidates the terms of the guarantee.

Replacement of Parts

Replacing the Electronic Insert

Removal

Switch off all sources of power to the Nivocompact.

- Remove the electrical connections to the electronic insert.
- Loosen the central screw in the electronic insert.
- Lift out the electronic insert from the housing using the handle.

Insertion

- Push the new electronic insert carefully into the plug in the housing.
- Tighten the central screw.
- Connect up the electrical wires.

Calibration or Adjustment

- Switch off the power supply.
- Turn the adjuster for contact resistance to the standard position

or

- Carry out a resistance calibration with the probes covered.
- Select the same fail-safe mode as for the previous electronic insert.
- Check operation.

Replacing Probe Rods

Carry out the procedure as described in »Installation«, Page 12.

Returning Parts for Repair

If a Nivocompact FTC 131 cannot be repaired and needs to be sent back to Endress+Hauser, then please note the following:

Cleaning the Probe

Remove all material residue attached to the probe.
This is especially important as the material may be of a dangerous nature, e.g. corrosive, poisonous, carcinogenic, radioactive, etc.
Please return parts only after they have been thoroughly cleaned of dangerous materials. Check in particular scratches and the possibility of diffusion through plastic material.

Stating Material and Defect

When returning the probe, please state exactly the product in which it was used and its characteristics.
A brief description of the error will also help us to diagnose the reason for it and at the same time lower your costs.

Thank you for your cooperation.

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